Nicotine Dependence and Associated Factors

Dependência em Nicotina e Fatores Associados

Dependencia de Nicotina y Factores Asociados

RESUMO

Objetivo: identificar os fatores associados a dependência em nicotina em participantes de grupos antitabagismo realizados por quatro Unidades Básicas de Saúde de Caxias do Sul no ano de 2023. **Metodologia:** trata-se de um estudo transversal com abordagem quantitativa, realizado com dados de 73 instrumentos de anamneses clínica. O projeto de pesquisa foi aprovado por comitê de ética em pesquisa sob o parecer de número 6.740.787 e CAAE 77888524.1.0000.5341. **Resultados:** 20,5% dos participantes apresentaram grau de dependência em nicotina baixo, 50,7% moderado e 28,8% alto. A regressão logística ordinal múltipla revelou maiores chances de dependência em nicotina alta nos participantes com história de problema pulmonar (OR= 5,42 IC 95%= 1,92-15,32). **Conclusão:** A dependência em nicotina acarreta sérios prejuízos para a saúde da população. O uso de todas as formas de nicotina deve ser combatido.

PALAVRAS CHAVE: Tabagismo; Dependência de Nicotina; Abandono do hábito de fumar; Controle do tabagismo; Programa de controle do tabagismo

ABSTRACT

Objective: to identify factors associated with nicotine dependence in participants in anti-smoking groups held by four Basic Health Units in Caxias do Sul in 2023. **Methodology:** this is a cross-sectional study with a quantitative approach, carried out with data from 73 instruments of clinical anamnesis. The research project was approved by the research ethics committee under opinion number 6,740,787 and CAAE 77888524.1.0000.5341. **Results:** 20.5% of participants had a low degree of nicotine dependence, 50.7% moderate and 28.8% high. Multiple ordinal logistic regression revealed greater chances of high nicotine dependence in participants with a history of lung problems (OR= 5.42 95% CI= 1.92-15.32). **Conclusion:** Nicotine dependence causes serious harm to population health. The use of all forms of nicotine must be avoided.

KEYWORDS: Smoking; Nicotine dependence; Giving up the smoking habit; Tobacco control; Tobacco Control Program

RESUMEN

Objetivo: identificar factores asociados a la dependencia de la nicotina en participantes de grupos antitabaco realizados en cuatro Unidades Básicas de Salud en Caxias do Sul en 2023. **Metodología:** se trata de un estudio transversal, con abordaje cuantitativo, realizado con datos de 73 instrumentos de la anamnesis clínica. El proyecto de investigación fue aprobado por el comité de ética en investigación bajo dictamen número 6.740.787 y CAAE 77888524.1.0000.5341. **Resultados:** El 20,5% de los participantes presentó un grado de dependencia a la nicotina bajo, el 50,7% moderado y el 28,8% alto. La regresión logística ordinal múltiple reveló mayores posibilidades de alta dependencia de la nicotina en participantes con antecedentes de problemas pulmonares (OR= 5,42 IC 95%= 1,92-15,32). **Conclusión:** La dependencia de la nicotina causa graves daños a la salud de la población. Debe evitarse el uso de todas las formas de nicotina.

PALABRAS CLAVE: Tabaquismo; Dependencia de la nicotina; Dejar el hábito de fumar; Control del tabaco; Programa de control del tabaco.

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INTRODUCTION

Smoking is one of the modifiable risk factors that causes the most deaths worldwide. It is the main cause of lung cancer and contributes to the development of cardiovascular and pulmonary diseases and several other types of cancer. [1] It negatively impacts the quality of life of the population, whose health is also affected by passive smoking. [2]

Conventional cigarettes contain more than 4,700 toxic substances, the main ones being nicotine, tar, carbon monoxide, cadmium, nickel and formaldehyde, with nicotine being the main cause of chemical dependence on smoking. The most common way to assess the degree of nicotine dependence is by applying the Fagerström test. [3,4]

Nicotine is absorbed by the pulmonary alveoli and reaches the central nervous system within ten seconds, being distributed to all systems of the body. It produces several effects, mainly excitatory. The excitatory effects promote a rapid state of alertness and decreased appetite, in addition to inducing tolerance and dependence through action on central dopaminergic pathways, leading to feelings of pleasure and reward mediated by the limbic system. Each cigarette contains 7 to 9 mg of nicotine, of which just over 1 mg is absorbed by the smoker. The sensation of puffing on a cigarette is similar to that reported by crack users. [5,6]

The main systemic symptoms mediated by nicotinic receptors in the central nervous system are felt in the cardiovascular system through peripheral vasoconstriction, increasing blood pressure and heart rate; in the endocrine system through the release of antidiuretic hormone and fluid retention; in the gastrointestinal system, increasing the tone and motor activity of the intestine; and in nerve endings, stimulating the release of the neurotransmitters acetylcholine, dopamine, glutamate, serotonin and gamma-aminobutyric acid. [5]

Nicotine dependence is a chronic, progressive and recurrent disorder, influenced by environmental, biological, psychological and pharmacological factors. [6] Brazilian research conducted with smokers has revealed higher prevalence and associations of high nicotine dependence in males [7,8], who use alcoholic beverages [9], and other psychoactive drugs. [10] For most smokers with high nicotine dependence, the first cigarette lit after 5 minutes of waking up is the one that provides the most pleasure. [11] The number of cigarettes smoked per day is also related to the high degree of nicotine dependence. [8-12,13] A history of anxiety and depression is reported in the Brazilian literature as being important factors associated with a high degree of nicotine dependence. [8,9,10-14,15]

The impact of smoking on the health of the population has been widely researched, but there are few studies investigating the factors associated with the degree of nicotine dependence. Considering the need to expand knowledge on the subject in question, this study aimed to identify the factors associated with nicotine dependence in participants of anti-smoking groups held by four Basic Health Units in the Municipality of Caxias do Sul in 2023.

METHOD

This is a cross-sectional study with a quantitative approach. Initially, 97 anamnesis instruments performed on participants of anti-smoking groups in 2023 from four Basic Units in Caxias do Sul were identified. After reviewing the assessment instruments and the individual user registration regarding the completion of all questionnaire fields, 24 participants were excluded due to incomplete data. A total of 73 participants who presented complete data in both the individual registration and the anamnesis instrument were included in the study. The search for the individual user registration was carried out in the Integrated Health Services Management System. This study was approved by the research ethics committee under opinion No. 6,740,787 and CAAE 77888524.1.0000.5341.

Sociodemographic data were collected from the individual user registration. The following variables were collected: sex (woman, man, transgender man, transgender woman, others), age (reported in complete years), race (self-declared as yellow, white, indigenous, brown, black and no information) and education (none, adult literacy, literacy class, daycare, preschool, elementary school 1st to 4th grades, elementary school 5th to 9th grades, complete elementary school, EJA elementary school final grades 5th to 9th grades, EJA elementary school initial grades 1st to 4th grades, special elementary school, EJA supplementary high school, special high school, high school 2nd scientific cycle, technical, etc., higher education, improvement, specialization, master's and doctorate).

The health, behavioral and mental health condition variables were collected from the clinical anamnesis instrument for smoking treatment. The health condition variables were collected from the participant's pathological history and are: Do you have or have you had diabetes? (yes or no), Do you have or have you had hypertension? (yes or no), Do

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you have or have you had heart problems? (yes or no), Do you have or have you had lung problems? (yes or no), Do you have or have you had respiratory allergies? (yes or no), Do you have or have you had depression or anxiety attacks? (yes or no), Do you have or have you had psychological or psychiatric treatment? (yes or no), Do you have or have you had anorexia nervosa or bulimia? (yes or no), Do you have or have you had seizures or epilepsy? (yes or no), Do you have or have you had a malignant lesion or tumor? (yes or no), Do you have or have you had a skin allergy (yes or no), Do you have or have you had mouth ulcers, lesions or bleeding? (yes or no), Do you have or have you had stomach pain, ulcer or gastritis? (yes or no), Other diseases? (yes or no).

The behavioral variables collected were smoking history and alcoholism tendency. Smoking history was assessed through the question: At what age did you start smoking? (reported in full years). Alcoholism tendency was assessed through the CAGE test. The test is easy to administer and consists of four questions. The four questions, which include the anagrams Cut Down, Annoyed, Guilty and Eye-Opener, are: Have you ever felt that you should reduce the amount of alcohol you drink or stop drinking? Do people annoy you because they criticize your way of drinking alcohol? Do you usually drink alcohol in the morning to reduce nervousness or hangovers? The answer options are yes or no. Participants who present three or more affirmative answers are considered to have a significant alcoholism tendency. [25].

Mental health was assessed using the PHQ-9. The PHQ-9 is a questionnaire used to screen for major depressive episodes. The instrument has been validated for use in Brazil and has high sensitivity and specificity for identifying patients at risk for depression. The instrument consists of nine questions that assess the presence of each of the symptoms for a major depressive episode. The nine symptoms consist of depressed mood, anhedonia, sleep problems, fatigue or lack of energy, changes in appetite or weight, feelings of guilt or worthlessness, concentration problems, feeling slow or restless, and suicidal thoughts. The frequency of each symptom in the last two weeks is assessed on a Likert scale from 0 to 3, corresponding to the responses "not at all", "several days", "more than half the days" and "almost every day", respectively. The questionnaire also includes a tenth question that assesses the interference of these symptoms in the performance of daily activities. [16] In this study, participants with scores ≥ 9 points were classified as at risk for depression. The degree of nicotine dependence was assessed using the Fagerström test. The instrument is a modified version of the Fagerström Tolerance Questionnaire created in 1978. The current version of the test was validated and adapted to the Portuguese language in 2002. [17] The test has 6 questions with scores ranging from 0 to 10 points. Scores between 0 and 2 points consider the participant to have very low nicotine dependence, 3 to 4 points low dependence, 5 points moderate dependence, 6 to 7 points high dependence and 8 to 10 points very high dependence. [17] In this study, the degree of nicotine dependence will be divided into quartiles. The quartile with the lowest values will be considered a low degree of dependence, the quartile between the minimum and medium degree of moderate dependence, and the quartile with the highest values of high dependence.

For data analysis, the absolute and relative frequencies of sociodemographic variables, health conditions and behaviors, mental health, and degree of nicotine dependence were initially obtained. Ordinal logistic regression analyses were then performed to obtain the crude and adjusted Odds Ratios (OR) with their respective Confidence Intervals (95% CI). The adjusted analysis was performed based on a theoretical model of four blocks. The distal block I included the sociodemographic variables. The intermediate block II included the health condition variables. The intermediate block III included the behavioral variables, and the proximal block IV included the mental health variable. The criterion of $p \leq 0.20$ was adopted for the variables to remain in the model. Associations with nicotine dependence were considered when $p \leq 0.05$. Analyses were performed using SPSS version 26.0.

RESULTS

Seventy-three participants from anti-smoking groups were included in this study. The prevalence of low-level nicotine dependence was identified in 20.5% of the participants. 50.7% had a moderate level of nicotine dependence. 28.8% had a high level of nicotine dependence (Table 1). Table 1 indicates that the sample was represented more frequently by women (75.3%), by participants aged 50 or over (60.3%), by those who self-identified as white (72.6%) and who had elementary education (69.9%). Regarding health conditions, the majority reported no changes in the oral cavity (84.9%), no diabetes (76.7%), no hypertension (52.1%), no heart problems (80.8%), gastrointestinal problems (52.1%), no lung problems (60.3%), no respiratory allergies (72.6%), no skin allergies (90.4%), no history of malignant tumors (84.9%), no history of seizures (94.5%), no bulimia or anorexia (97.3%), no other diseases (57.5%), use of medication (80.8%), have a history of anxiety and depression crises (71.2%) and no history of psychiatric treatment (57.5%). The behavioral variables smoking history and tendency to alcoholism were predominantly represented by those who started smoking between the ages of 14 and 18 (43.8%) and by those who had no tendency to alcoholism (57.5%). Regarding mental health, most participants were not at risk for a major depressive episode (57.5%) (Table 1).

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Tabela 1- Descrição das características sociodemográficas, condições e comportamentos de saúde e da saúde mental de participantes de grupos antitabagismo de quatro Unidades Básicas de Saúde de Caxias do Sul-RS, 2023 (N=73).

Variables	n	(%)
Gender		
Male	18	24,7
Female	55	75,3
Age Group		
18 - 35 y/o	5	6,8
35 - 40 y/o	24	32,9
50 years or older	44	60,3
Race		
White	53	72,6
Black	6	8,2
Brown	14	19,2
Education		
Illiterate	1	1,4
Elementary School	51	69,9
High School and Higher Education	21	28,8
Changes in the oral cavity		
Yes	11	15,1
No	62	84,9
Diabetes		
Yes	17	23,3
No	56	76,7
Hypertension		
Yes	35	47,9
No	38	52,1
Heart Problem		
Yes	14	19,2
No	59	80,8
Gastrointestinal Problem		
Yes	38	52,1
No	35	47,9
Lung Problem		
Yes	29	39,7
No	44	60,3

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Skin Allergy		
Yes	7	9,6
No	66	90,4
Respiratory Allergy		
Yes	20	27,4
No	53	72,6
Malignant Tumor		
Yes	11	15,1
No	62	84,9
Convulsion		
Yes	4	5,5
No	69	94,5
Anorexia or Bulimia		
Yes	2	2,7
No	71	97,3
Anxiety Attack or Depression		
Yes	52	71,2
No	21	28,8
Use of medication		
Yes	59	80,8
No	14	19,2
Other diseases		
Yes	31	42,5
No	42	57,5
Psychiatric or psychological treatment		
Yes	36	49,3
No	37	50,7
Tendency to alcoholism		
Yes	8	89
No	65	11
Smoking history		
8 - 13 years	28	38,4
14 - 18 years	32	43,8
19 years or older	13	17,8
PHQ-9		
<9 points	42	57,5
≥9 points	31	42,5

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Degree of Nicotine Dependence		
Low	15	20,5
Moderate	37	50,7
High	21	28,8

In the crude ordinal regression, those with a history of lung problems were more likely to have a high degree of nicotine dependence. The adjusted analysis revealed that participants with a history of lung problems were 5.42 times more likely to have a high degree of nicotine dependence than those who did not have lung problems (Table 2).

Table 2- Crude and adjusted odds ratios and 95% confidence intervals of the degree of nicotine dependence, according to sociodemographic variables, health conditions and behaviors, and mental health of participants in anti-smoking groups at four Basic Health Units in Caxias do Sul-RS, 2023 (N=73).

Variables	Crude Analysis (95% CI)	p value	Adjusted Analysis (95% CI)	p value
Gender				
Male	1,12 (0,40-3,12)	0,819		
Female	1			
Age group				
18 - 35 y/o	0,59 (0,11-3,01)	0,321		
35 - 40 y/o	1,79 (0,69-4,60)			
50 years or olders	1			
Race				
White	1,24 (0,44-3,51)	0,567		
Black	2,70 (0,43-16,93)			
Brown	1			
Education				
Illiterate	0,46 (0,01-13,27)	0,301		
Elementary School	0,46 (0,17-1,22)			
High School and Higher Education	1			
Changes in the oral cavity				
Yes	0,39 (0,10-1,47)	0,165		
No	1			
Diabetes				
Yes	0,74 (0,27-2,01)	0,558		
No	1			
Hypertension				
Yes	1,20 (0,50-2,89)	0,670		
No	1			

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Heart problem		0,152		
Yes	2,14 (0,75-6,08)			
No	1			
Gastrointestinal Problem		0,505		
Yes	1,34 (0,56-3,21)			
No	1			
Lung Problem		0,001		0,001*
Yes	5,12 (1,91-13,74)		5,42 (1,92-15,32)	
No	1		1	
Skin Allergy		0,192		
Yes	2,60 (0,61-11,02)			
No	1			
Respiratory Allergy		0,105		
Yes	2,26 (0,84-6,07)			
No	1			
Malignant Tumor		0,146		
Yes	2,49 (0,72-8,56)			
No	1			
Convulsion		0,674		
Yes	1,46 (0,24-8,56)			
No	1			
Anorexia or Bulimia		0,411		
Yes	3,02 (0,21-42,28)			
No	1			
Anxiety Attack or Depression		0,082		
Yes	2,41 (0,89-6,52)			
No	1			
Use of medication		0,180		
Yes	2,18 (0,69-6,85)			
No	1			
Other Diseases		0,241		
Yes	0,58 (0,24-1,43)			
No	1			
Psychiatric or psychological treatment		0,309		
Yes	1,57 (0,65-3,78)			
No	1			

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Tendency to alcoholism		0,751		
Yes	1,28 (0,28-5,81)			
No	1			
Smoking history		0,884		
8 - 13 years	0,73 (0,21-2,54)			
14 - 18 years	0,85 (0,26-2,86)			
19 years or older	1			
PHQ-9		0,06		
<9 points	0,43 (0,17-1,05)			
≥9 points	1			

Ordinal Regression Model: Adjusted for sociodemographic variables from the first block (sex, age group, race and education), health condition variables from the second block (changes in the oral cavity, diabetes, hypertension, heart problem, gastrointestinal problem, lung problem, skin allergy, respiratory allergy, malignant tumor, seizure, anorexia or bulimia, anxiety or depression crisis, use of medication, other diseases, psychiatric or psychological treatment), variables from the third block (tendency to alcoholism and smoking history) and variables from the fourth block of mental health (PHQ-9). *Statistical significance when p ≤0.05

DISCUSSION

This research revealed a high prevalence of nicotine dependence and the only factor associated with a greater chance of presenting a high degree of nicotine dependence was having a history of lung problems.

Lung damage occurs due to the inflammatory response caused by the high temperature of the cigarette reaching the airways. [18] Nicotine addiction is considered the main cause of the maintenance of the smoking habit, directly influencing the lung health of addicts and also of people who are exposed to passive smoking. [1-18]

Since scientific investigations into the harm caused by smoking gained momentum in the 20th century, lung problems have stood out as the most prevalent, especially when it comes to problems such as Chronic Obstructive Pulmonary Disease, Pulmonary Emphysema and Lung Cancer. [1]

The first study that demonstrated the causality between lung cancer and smoking was carried out 70 years ago by Doll and Hill and can be considered a watershed in terms of planning public policies to combat smoking. [19] Since then, new scientific evidence has supported the researchers' findings. [20]

The finding found in this research between having a history of lung problems and a high degree of nicotine dependence reinforces what has historically been revealed by studies on the harm that smoking causes to people's health, especially to the respiratory system, as demonstrated by the literature review that aimed to understand the importance of lung health and the relationship between smoking and the main chronic obstructive pulmonary diseases. [21]

In a study conducted with employees, teachers and students of the Faculty of Science and Technology of Presidente Prudente, which aimed to understand the characteristics of the smoking habit in terms of the degree of nicotine dependence, cigarette consumption, presence of respiratory symptoms and changes in lung function, it was found that respiratory symptoms were present in all degrees of nicotine dependence. Participants with higher levels reported more symptoms such as shortness of breath, fatigue, chest pain, coughing and phlegm [22], corroborating what was also identified in this research.

This study did not identify the association between the chance of high nicotine dependence and gender, identified in some current cross-sectional studies that address this topic. [23,24] However, the sample of this research was predominantly represented by women (75.3%), in line with current statistics that point to a higher prevalence of smoking in males, but with a slower decline in smoking in women. [24]

The relationship between depression and the chance of high nicotine dependence, which is frequently identified in studies conducted on smoking, was not found in this study. [8,9,10-14,15] However, the high prevalence of participants with a history of anxiety attacks or depression (71.2%) and the score ≥ 9 points on the PHQ-9 presented by 42.5% of participants is noteworthy. These high prevalences point to the need for broader investigations into the mental health of smokers, in order to identify the possible relationship between other psychiatric disorders and nicotine dependence.

The limitations of the study related to its cross-sectional nature suggest caution in interpreting the findings due to the possibility of reverse causality.

CONCLUSION

Anti-smoking groups run by the SUS health services are an important

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support network for smokers seeking to quit the habit. This important public health strategy, in addition to contributing to the reduction in the prevalence of smoking in the country, also allows us to understand the epidemiological profile and risk factors associated with the degree of nicotine dependence.

Treatment for nicotine dependence can be a difficult process for the patient due to withdrawal symptoms, which can be more intense for those with a high degree of dependence. This is why some patients are unable to quit the habit on the first attempt at treatment.

Nicotine is a highly addictive substance that causes different degrees of dependence, ranging from very low to very high. In this study, it was possible to identify that among participants who had a history of lung problems, the chance of developing nicotine dependence was greater than those who did not have lung problems. This finding indicates that despite the successful efforts made by governmental and intergovernmental organizations to combat smoking, nicotine dependence is still an important risk factor for the worsening and emergence of diseases. Its combat should be continuously carried out in order to promote a society that is more aware of the harm that this habit causes to health.

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